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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/712,168	11/12/2003	James Mac Freitag	HITG.044PA(0552)	8244

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EXAMINER

CAO, ALLEN T

ART UNIT	PAPER NUMBER
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2627

DATE MAILED: 03/23/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/712,168

Applicant(s)

FREITAG ET AL.

Examiner

Allen T. Cao

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 January 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-8 and 13-17 are rejected under 35 U.S.C. 102(e) as being anticipated by Pinarbasi (US. 6,728,083 B2).

The applied reference has a common assignee and inventor with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention “by another,” or by an appropriate showing under 37 CFR 1.131.

Pinarbasi discloses a magnetic sensor having a pinned layer 204; a separation layer 202 formed over the pinned layer 204; a first free layer 310 having a first thickness formed over the separation layer 202; and a second free layer 312 having a second thickness formed over the first free layer 310, wherein the ratio of the first thickness and second thickness is inherently selected to provide “a desired magnetostriction”, all as set forth in claims 1, 5, 13, 15 and 17. Pinarbasi also discloses an antiferromagnetic pinning layer 214, hard magnetic films (140, 144) in an abutting relationship with the

free layer structure on both sides of the free layer structure (figure 9 shows that the hard magnetic films 140 and 144 abut to the spin valve sensor, thus its abut to the free layer structure) and a seed layer 220 as recited in claims 13 and 15.

Regarding claims 2, 6, 14 and 16, Pinarbasi discloses that the first free layer comprises CoFe and the second free layer comprises NiFe (figure 11).

Regarding claims 3-4 and 7-8, Ohsawa et al discloses that the separation layer is either a conductor layer (Cu) or an insulation layer (nonmagnetic electrically nonconductive material).

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being obvious over Pinarbasi in view of Gill (US. 2005/0017314 A1).

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art only under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 103(a) might be overcome by: (1) a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not an invention "by another"; (2) a showing of a date of invention for the claimed subject matter of the application which corresponds to subject matter disclosed but not claimed

in the reference, prior to the effective U.S. filing date of the reference under 37 CFR 1.131; or (3) an oath or declaration under 37 CFR 1.130 stating that the application and reference are currently owned by the same party and that the inventor named in the application is the prior inventor under 35 U.S.C. 104, together with a terminal disclaimer in accordance with 37 CFR 1.321(c). This rejection might also be overcome by showing that the reference is disqualified under 35 U.S.C. 103(c) as prior art in a rejection under 35 U.S.C. 103(a). See MPEP § 706.02(I)(1) and § 706.02(I)(2).

Pinarbasi does not disclose a magnetoresistance detector as set forth in claims 9 and 11.

Gill discloses a magnetic tunnel sensor includes I detector coupled to the free layer structure (230, 232) at 226 as recited in claims 9 and 11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the sensor of Pinarbasi with a detector as set forth, supra as taught by Gill for detecting the amount of current go through the sensor which inherently based on magnetic orientations of the free layer structure in order to improve the magnetic flux efficiency of the sensor, thus improve read/write characteristics of the head.

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the

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applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 1-8 and 17 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohsawa et al (US. 2002/0039264 A1).

Ohsawa et al (particularly figures 12-13) discloses a magnetic sensor having a pinned layer 9a; a separation layer 9b formed over the pinned layer 9a; a first free layer 9c having a first thickness formed over the separation layer 9b; and a second free layer 9d having a second thickness formed over the first free layer 9c, wherein the ratio of the first thickness and second thickness is inherently selected to provide "a desired magnetostriction", all as set forth in claims 1, 5 and 17.

Regarding claims 2 and 6, Ohsawa et al discloses that the first free layer comprises CoFe and the second free layer comprises NiFe ([0176]).

Regarding claims 3-4 and 7-8, Ohsawa et al discloses that the separation layer is either a conductor layer (Cu) or an insulation layer ([0122]).

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 9-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et al.

Ohsawa et al discloses such limitations as set forth in the above paragraph for claims 9 and 11.

Ohsawa et al inherently discloses a current source coupled to the magnetic tunnel junction device (sense current; [0278], line 34; it is also recognized that the disk drive system (figure 62) having a current source which will delivered a current to the magnetic head).

Ohsawa et al also discloses a disk drive having a removable magnetic recording medium [0326] and an actuator, coupled to the magnetic sensor, for moving the sensor relative to the medium (figure 62), all as set forth in claims 9 and 11.

Ohsawa et al further discloses a magnetoresistance "detector" ([0278]; particularly lines 5-8, CPP-MR film 204). Ohsawa et al furthermore discloses that "the sense current spreads in the free layer, so that it is possible to decrease the influence of the magnetic field due to the sense current on the free layer bias" ([0278], lines 34-37).

However, Ohsawa et al does not clearly disclose that the "detector" detects an electrical resistance through the magnetic sensor based on magnetic orientations of the first and second free layers as recited in claims 9 and 11.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to realize that the "detector" of Ohsawa et al can be recognized as an detector for detecting an electrical resistance through the magnetic sensor based on magnetic orientations of the first and second free layers to improve the proportion of noises to output signals (S/N ratio) in order to improve the magnetic flux efficiency.

Regarding claims 10 and 12, Ohsawa et al discloses that the first free layer comprises CoFe and the second free layer comprises NiFe ([0176]).

9. Claims 13-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over the embodiment of figures 1, 12-13 of Ohsawa et al in view of the embodiment of figures 22-31 of Ohsawa et al.

Ohsawa et al discloses such limitations as set forth in the above paragraph No. 2 for claims 13 and 15.

The embodiment of figures 1 and 12-13 of Ohsawa et al discloses the ferromagnetic pinned layer, an antiferromagnetic pinning layer [0175] and hard magnetic thin films (either 13's or 17's).

However, figures 1 and 12-13 do not disclose a seed layer.

Figures 22-31 of Ohsawa et al discloses that the layer 9f acts as a seed layer.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the A embodiment (figures 1 and 12-13) with a seed layer as taught by B embodiment (figures 22-31) as one well recognizing in the spin valve sensor technology.

Regarding claims 14 and 16, Ohsawa et al discloses that the first free layer comprises CoFe and the second free layer comprises NiFe ([0176]).

Response to Arguments

10. Applicant's arguments filed 1/3/06 have been fully considered but they are not persuasive.

In the Remarks, Applicant asserts that Ohsawa et al is not a proper basis for rejection because Ohsawa et al fails to suggest the ration of the first thickness and second thickness that is selected to provide a desired magnetostriction as claimed.

The Examiner respectfully points out that applicant only claims "... a first free layer having a first thickness ... a second free layer having a second thickness, the ratio of the first thickness and second thickness being selected to provide a desired magnetostriction". Applicant does not clearly define what is an exactly the ratio number and what is exactly amount of "magnetostriction". Applicant only broadly claims there is a ration between the thicknesses of the free layers and there is a "desired" magnetostriction.

Pinarbasi has been relied upon for disclosing a magnetic sensor having a pinned layer 204; a separation layer 202 formed over the pinned layer 204; a first free layer 310 having a first thickness formed over the separation layer 202; and a second free layer 312 having a second thickness formed over the first free layer 310. Since Pinarbasi discloses that first free layer and the second free layer have different thicknesses (the first thickness and the second thickness), it is inherently shown that there is a ratio between the thicknesses of the first free layer and the second free layer. The free layers have magnetostriction. Therefore, the ratio of the first thickness and second thickness is

inherently selected to provide "a desired magnetostriction", as broadly claimed by Applicant.

Therefore, the Examiner maintains that the rejection is proper.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Allen T. Cao whose telephone number is (571) 272-7569. The examiner can normally be reached on Mon - Thurs (7:30 - 6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hoa T. Nguyen can be reached on (571) 272-7579. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Allen Cao
Primary Examiner

AC
March 14, 2006